A Common Framework for Monitoring the Recovery of Puget Sound Chinook Salmon and Adapting Salmon Recovery Plans

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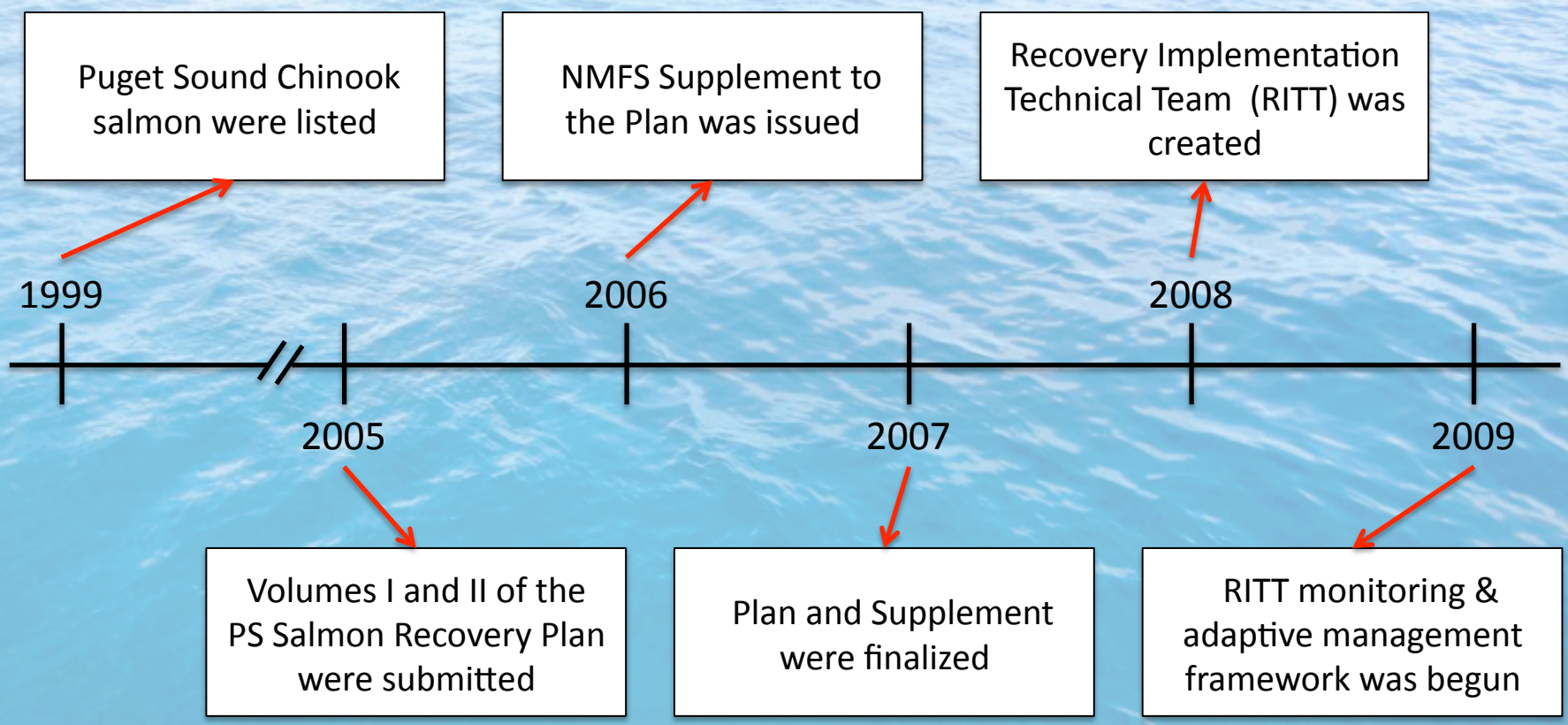
PugetSoundPartnership

CENTER FOR URBAN WATERS

Recovery **I**mplementation **T**echnical **T**eam (RITT)

- " … supports the recovery of Pacific salmon in Puget Sound to robust and harvestable levels by providing scientific support …"
- to … PS Salmon Recovery Council -- NOAA -- Partnership -- Watershed groups -- Resource Managers (tribes and state)
- Currently 7 members: employed by tribes, NWIFC, WDFW, NWFSC, private sector

The Framework – Background



The NMFS Supplement identified the development and implementation of a rigorous monitoring and adaptive management framework as something both critical to Plan implementation and incomplete

The Framework – Overview

It provides guidance for watershed groups to create monitoring and adaptive management plans for each "Volume II chapter" that are consistent and integratable across the Puget Sound region

What it is:

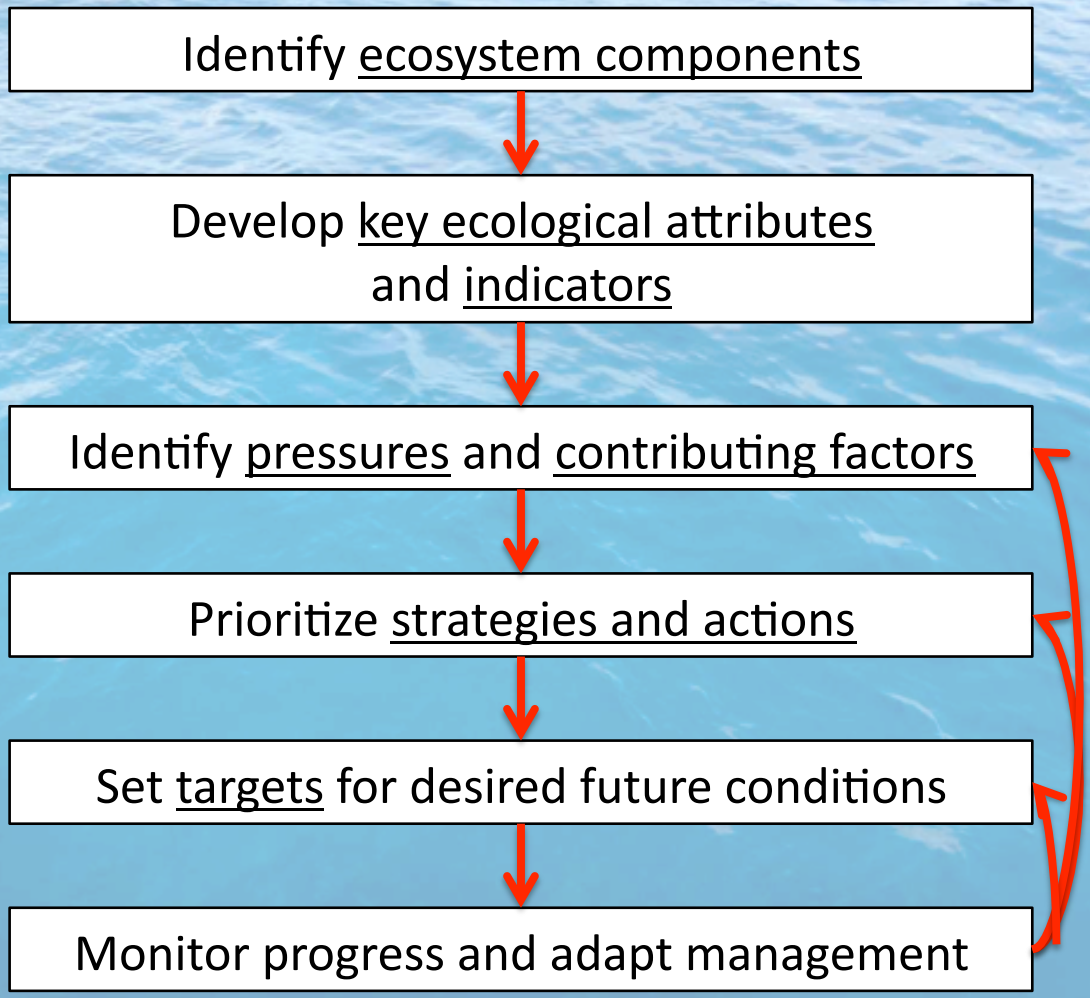
- A common approach for all watershed chapters in Volume II of the Plan
  - Tailored to meet the uniqueness of each watershed chapter
  - Focused on Chinook salmon but adaptable to other salmonids
  - Capable of integrating habitat, harvest, and hatchery management
- A framework, not a complete monitoring and adaptive management plan

Open Standards Process

We designed the framework to be consistent with the CMP's "Open Standards for the Practice of Conservation"

Open Standards Process in PSP Terminology

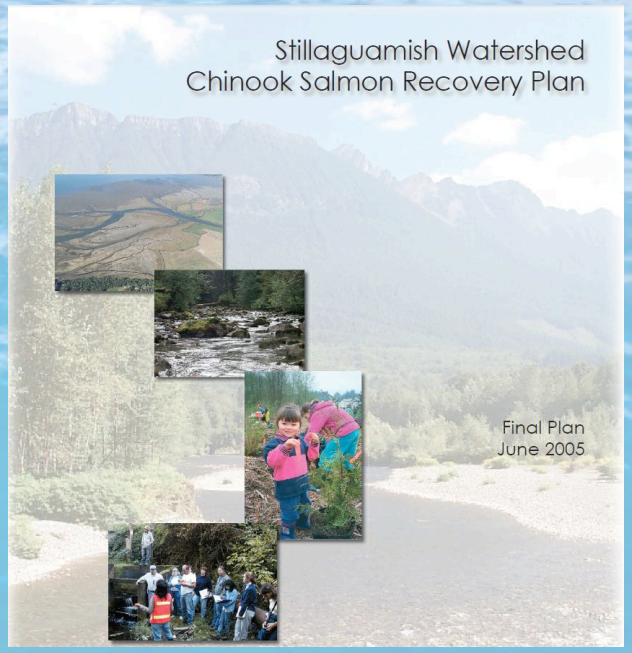
Translation into the terminology
adopted by the Puget Sound Partnership…



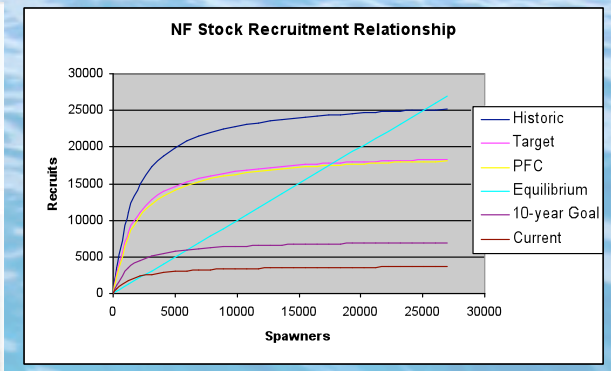
Applying Open Standards to Salmon Recovery

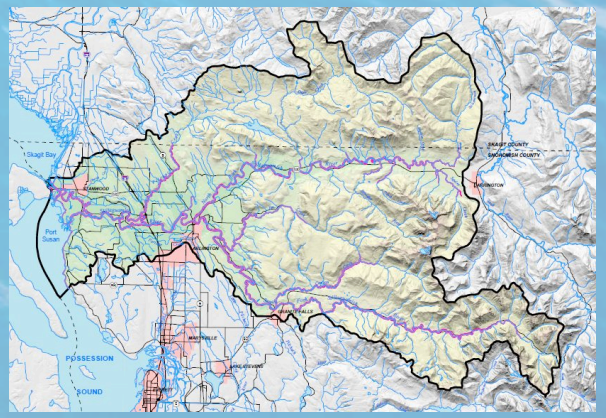
Ecosystem components

Strategies and actions



Targets for future conditions





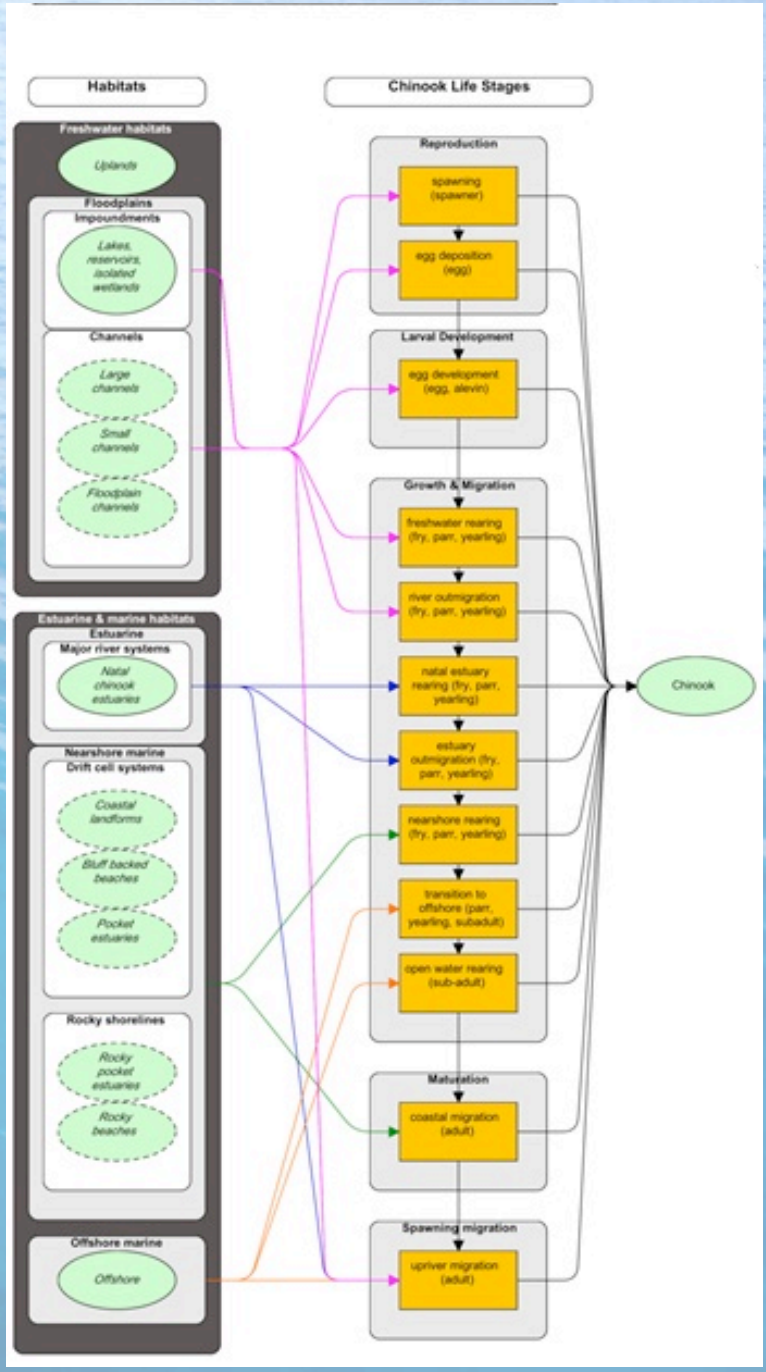
Ecosystem Components, KEAs, and Indicators

- **Ecosystem Components :**
  Specific species, systems, habitats, or processes that are the focus of the conservation effort

Categories	Ecosystem Components
Chinook salmon	Chinook salmon
Freshwater habitats	Uplands Large channels Small channels Side channels Other waterbodies
Estuarine and marine habitats	Natal Chinook estuaries Coastal landforms Bluff backed beaches Pocket estuaries Rocky pocket estuaries Rocky beaches Offshore marine
Species and food webs	Species and food webs

Habitat:Chinook Connection

- Life cycle embedded in chinook component
- Habitat components connected with different parts of the life cycle
- Indicators measured at a life stage associated with habitat components



Ecosystem Components, KEAs, and Indicators

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  Specific species, systems, habitats, or processes that are the focus of the conservation effort

- **Key Ecological Attributes (KEA):**
  Characteristics of an ecosystem component that, if missing or altered, would lead to the loss of that component over time

- **Indicators:**
  Specific units of information measured over time that document changes in the status of a KEA

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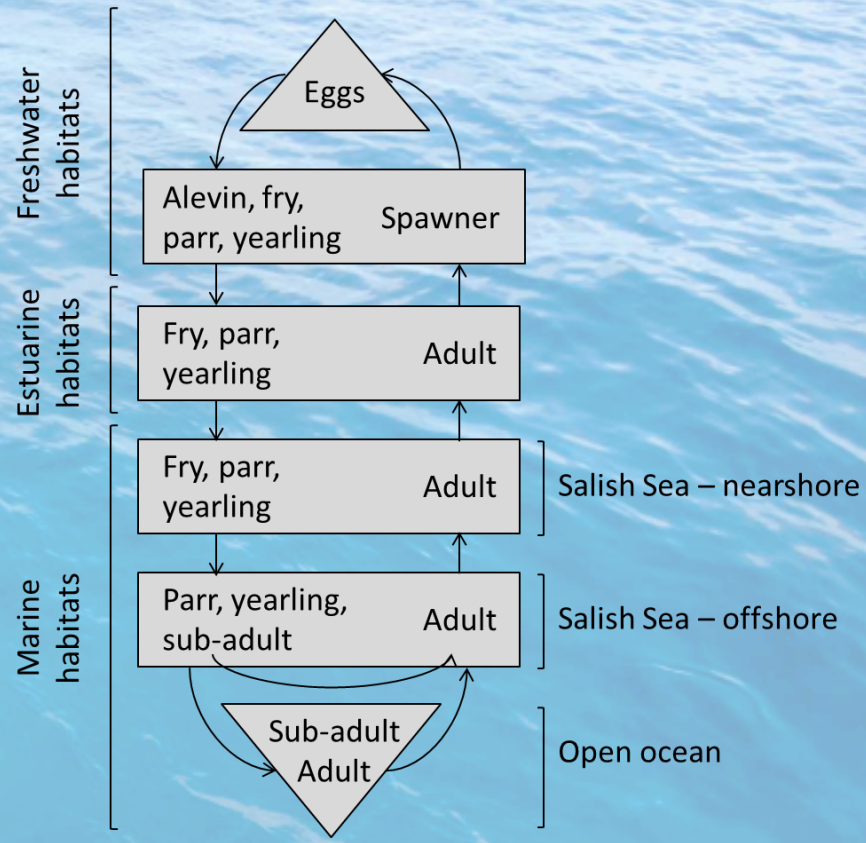
Key Ecological Attributes and Indicators

- Chinook Salmon (Table 3 & 4)
- Freshwater habitat (Table 8 & 9)
- Nearshore/Marine habitat (Table 11 & 12)
- Species and Food Webs (Table 15 & 16)

KEAs for Chinook Salmon

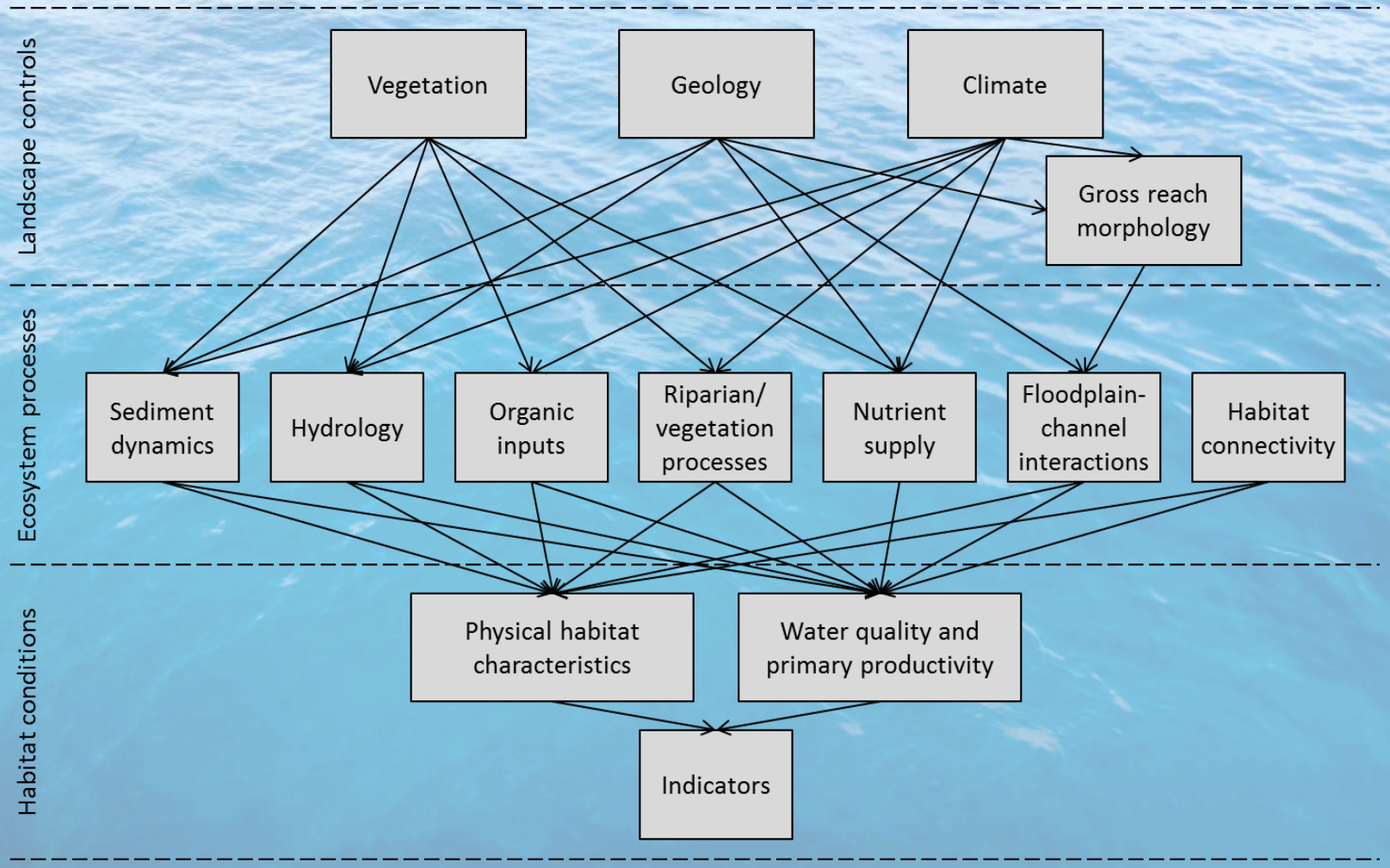
- Abundance
- Population Growth
- Fish Growth
- Survival Rate
- Spatial Distribution
- Genetic Diversity
- Life History Diversity



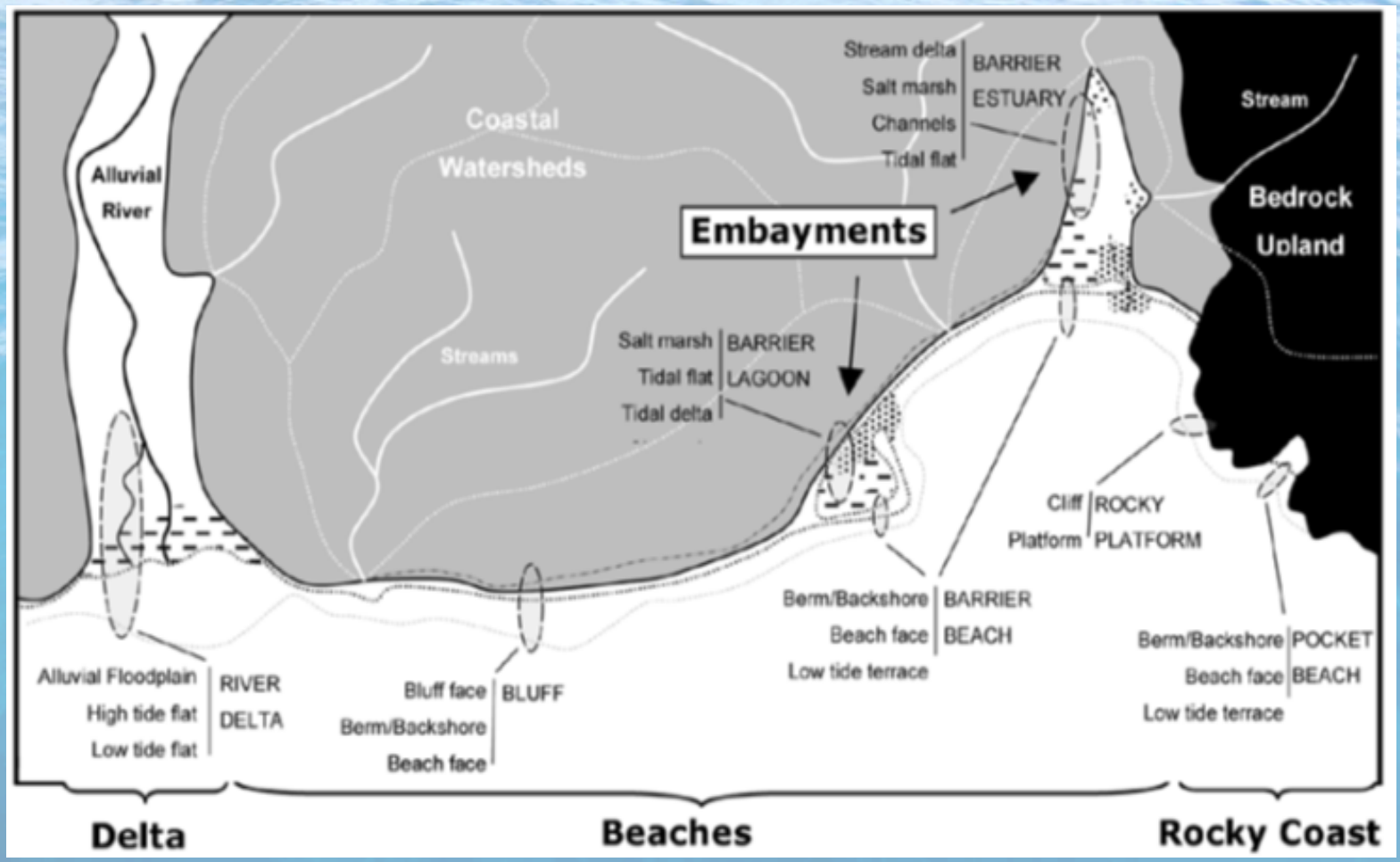
Chinook Salmon KEAs with example indicators
(Abundance and Productivity)

Subcomponent	Abundance	Survival Rate	Fish Growth	Population Growth Rate
Reproduction	•No of spawners •No of redds •No of eggs •Biomass of eggs	•Size of eggs	•Avg size at age	•Spawners/ brood year spawner •Fecundity
Larval development	•No of emerg fry	•Egg – fry surv.	•Avg size of emergent fry	
Growth and migration	•Density of parr •No of river outmigrants •No of estuary outmigrants	•Fry – estuary surv. •Survival in estuary •Ocean survival	•Inriver growth rate •River res time •Estuary grwth rate •Est. res time •Avg size	•Outmigrants/ spawner
Maturation	•No of fish recruiting to fisheries		•Avg size at age	
Spawning migration	•No of upriver migrants	•Inriver survival	•Avg size at age	•Recruits/ spawner

KEAs for Habitat based on physical processes



Nearshore KEAs: Habitat types



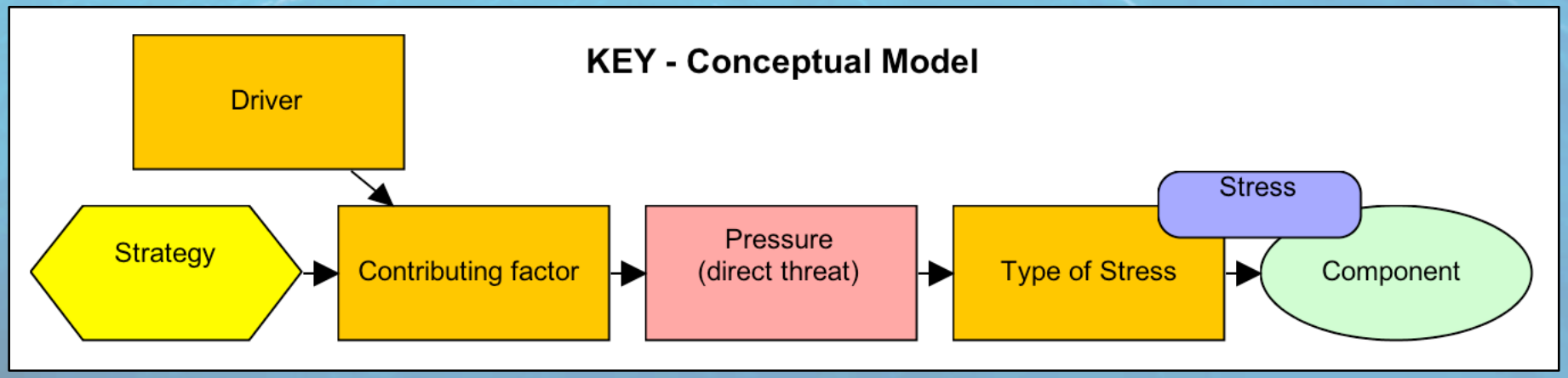
KEAs for Species and Food Webs

- Population size
- Population condition
- Community composition
- Energy and material flow

Conceptual Model

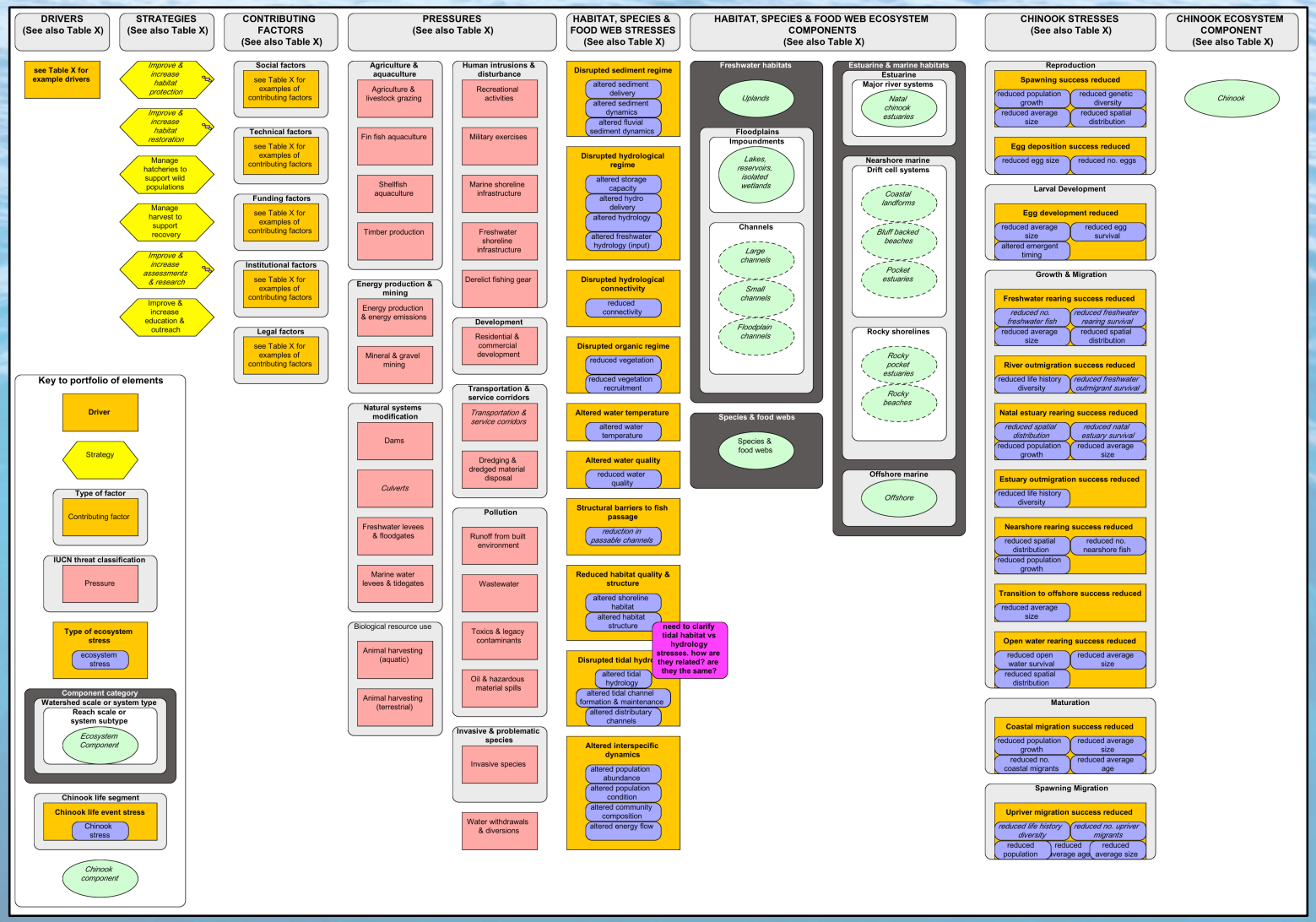
A “box and arrow” figure that depicts the cause-and-effect relationships Between the various “elements” in the framework:

- Strategies
- Drivers
- Contributing factors
- Pressures
- Stresses
- Ecosystem components

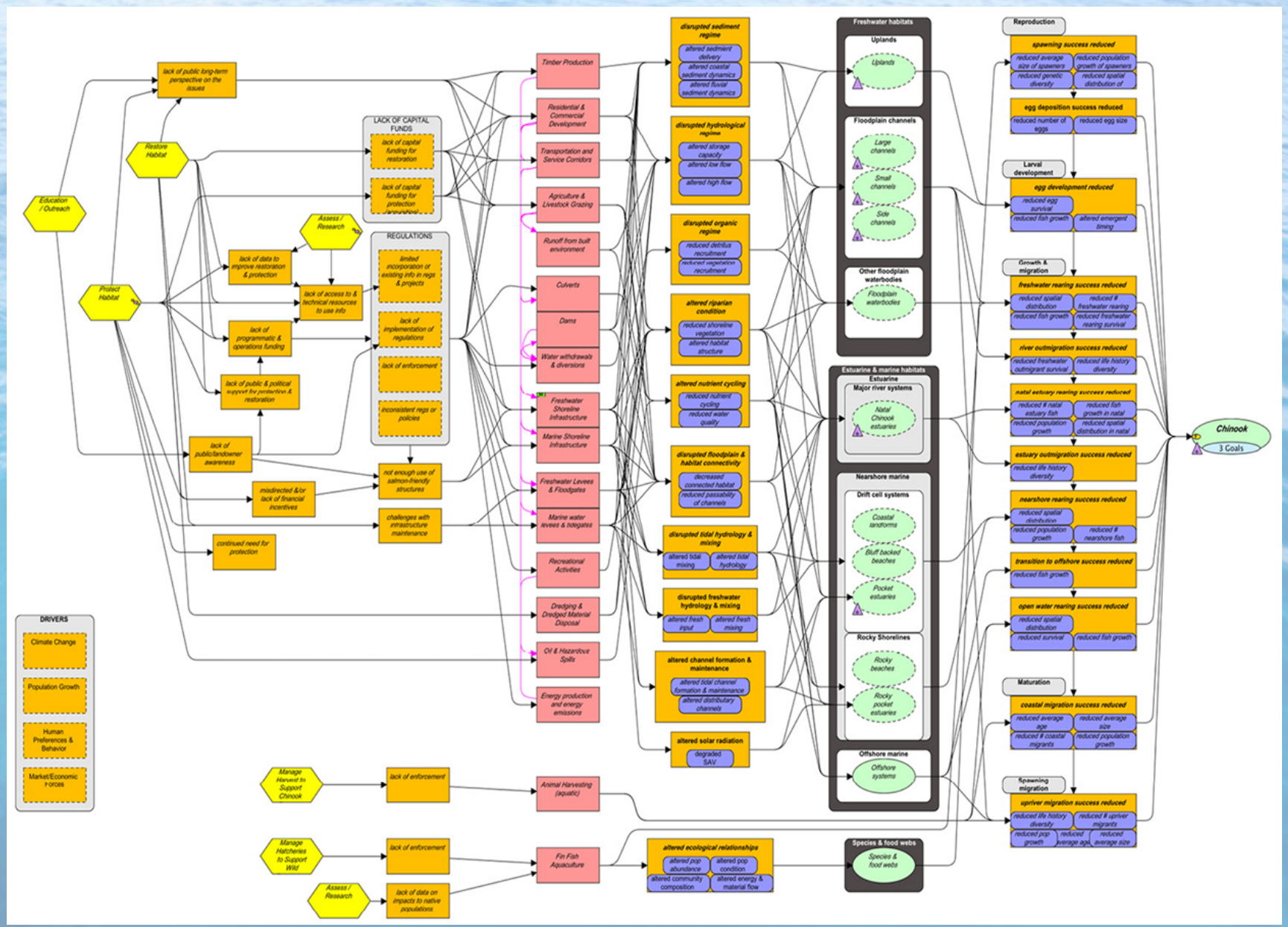


Conceptual Model – Portfolio of Elements

The framework contains a generic "portfolio of elements" that contains all possible boxes but no arrows.



Conceptual Model – Skagit Recovery Plan

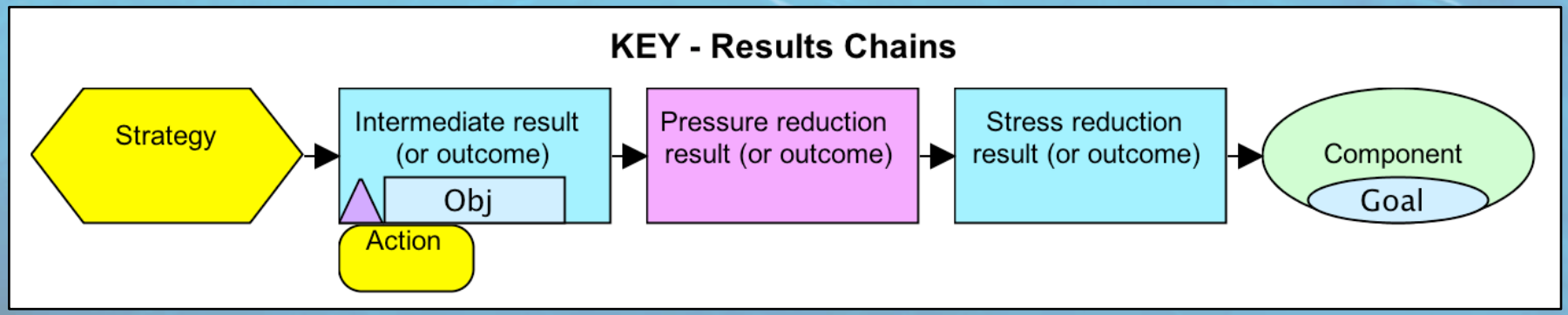


Results Chains

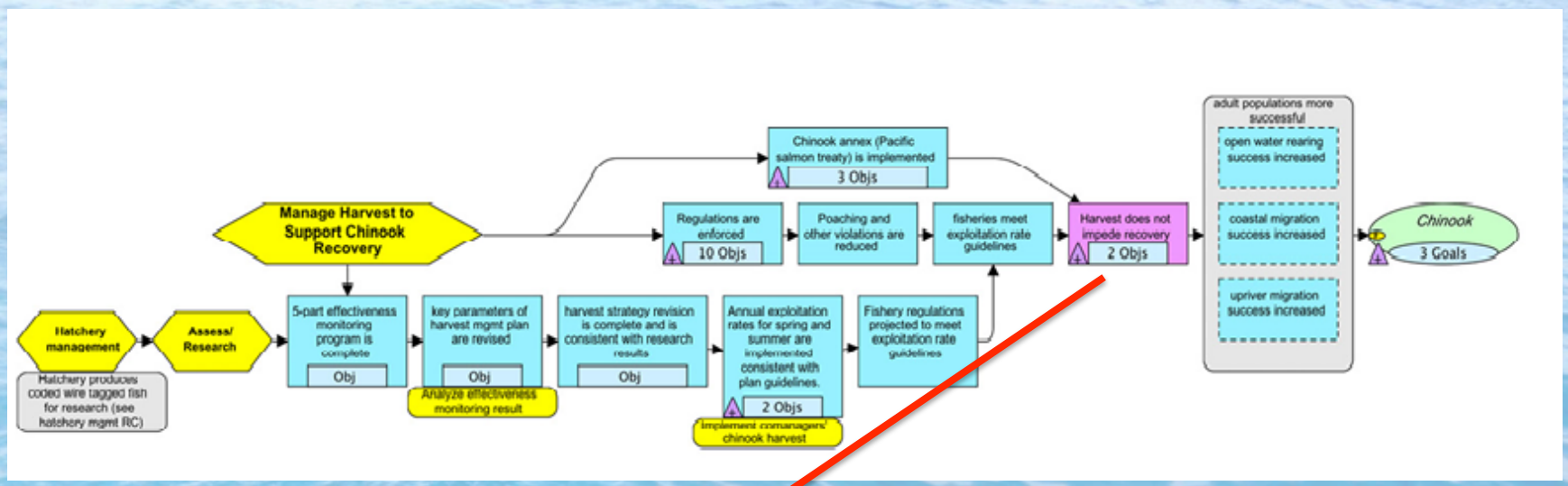
Results chains use the relationships shown in a conceptual model to articulate the hypothesized changes resulting from the implementation of a single strategy.

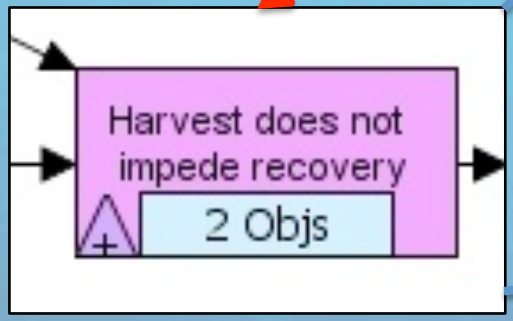
Results chains:

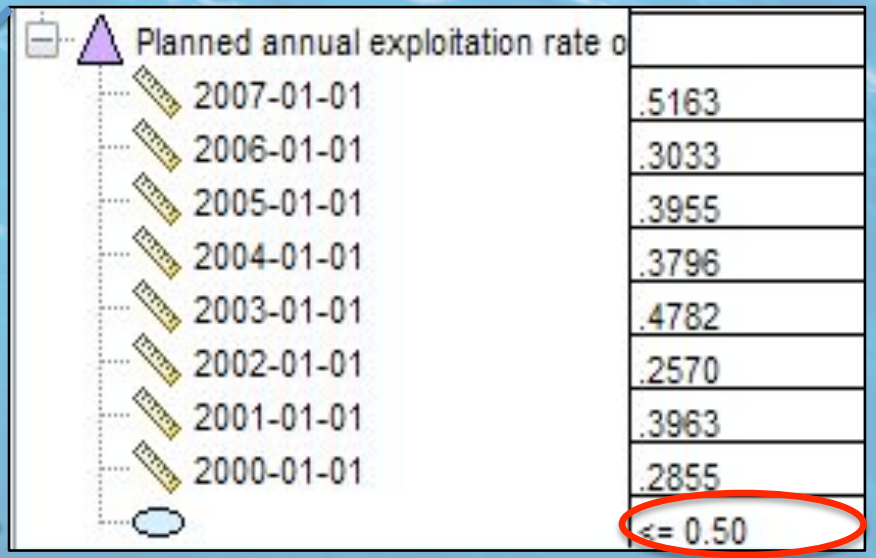
- Relate strategies to intermediate results and goals (or final outcomes)
- Include quantitative objectives and identify suitable indicators (△)
- Lead to a monitoring plan
- Show how monitoring results will lead to adaptation of the recovery plan



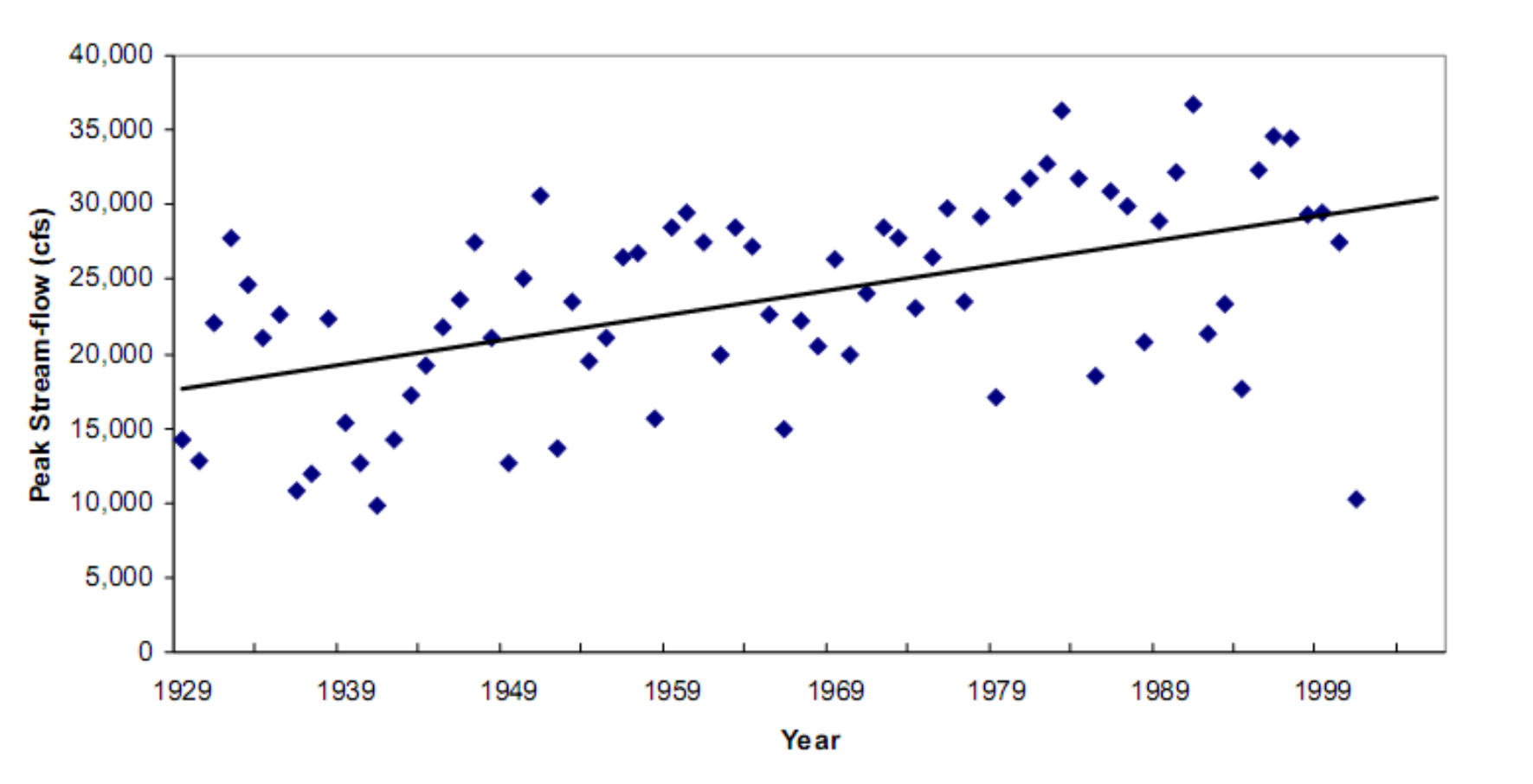
Results Chains – Skagit Harvest Management Example





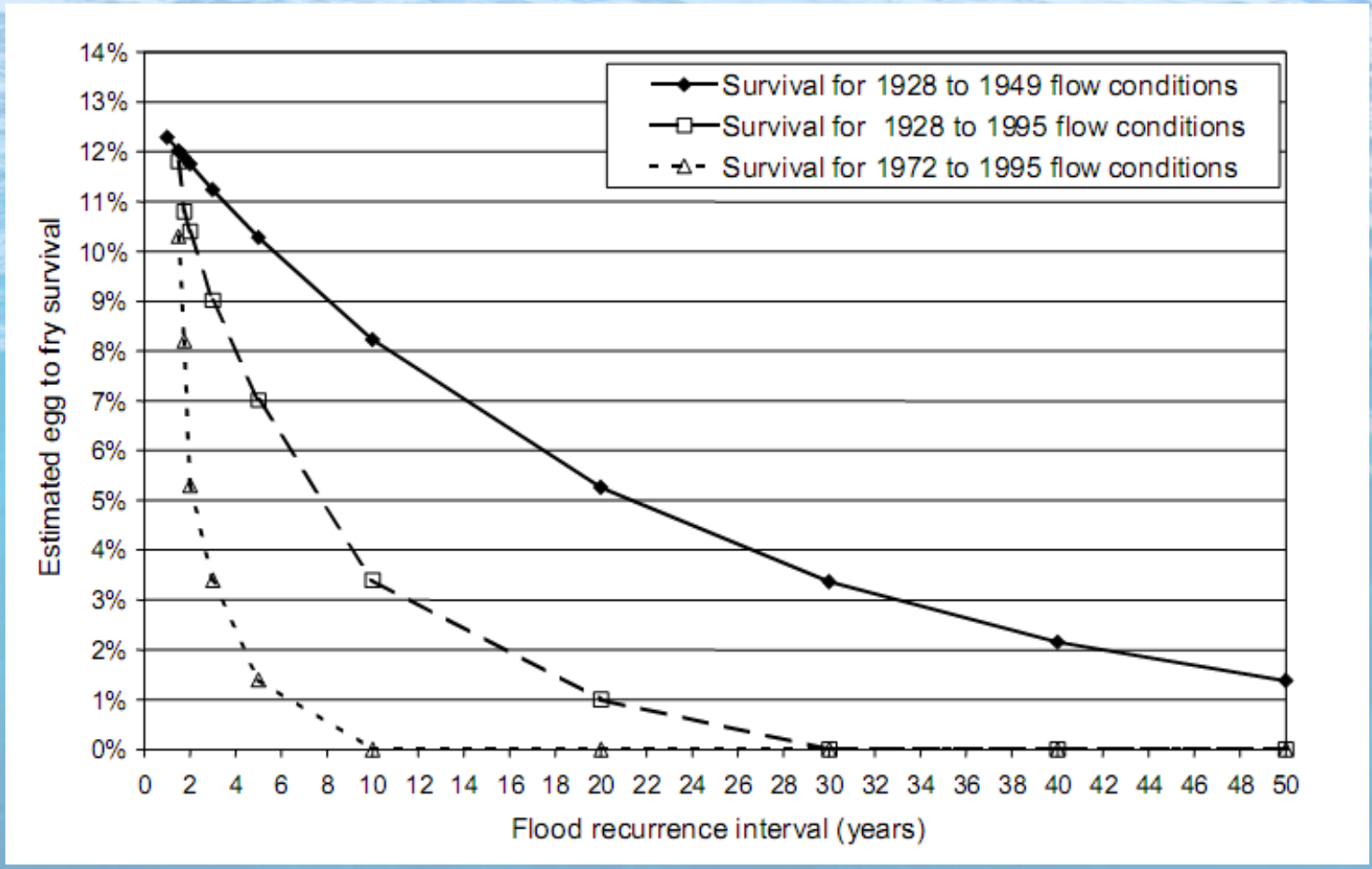


Increase in peak flows …



SOURCE: Stillaguamish Chinook Salmon Recovery Plan

… leading to reduced egg survival



SOURCE: Eric Beamer and George Pess 1999

Applying the Framework to 14 Watershed Plans

- Skagit, San Juan, and Hood Canal are current pilots
- Eight steps (see below) applied to all 14 watersheds
- RITT/ Partnership initial effort on Steps 1-2
- RITT will be involved in Steps 1-6

Applying the Framework

1. Develop watershed-specific conceptual model from 2005 plan
2. Modify to include changes since 2005
3. ID status, recent trends, desired future conditions
4. Evaluate and rank pressures

Applying the Framework (cont'd.)

5. Develop results chains for highest ranked pressures
6. ID objectives and indicators for intermediate results
7. Develop monitoring plan
8. Develop adaptive management plan

And … Regionally

- Identify common monitoring themes across watersheds
- Identify common policy needs/ problems across watersheds
- Develop solutions to the above

So what will this achieve?

- Meet the need/requirement for an adaptive management component in salmon recovery plan
  - Retain unique approach of each watershed chapter
  - Fill key gaps in each watershed chapter
  - Roll up watershed chapters to whole ESU